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NATIONAL GEOGRAPHIC PHOTOGRAPHER J. BAYLOR ROBERTS

because of them, Kimberley has made South Africa a famous country."

Piet paused a moment, thoughtfully. "You have me talking about diamonds when I was going to tell you about our Orange River," he said. "What other stream crosses nearly all South Africa? It flows from mountains to sea, passing over cataracts, through fine grazing lands, parched deserts. And its basin—the country it drains along with its tributaries—is 400,000 square miles. That's almost as large as your two biggest states, Texas and California, put together."

"You said it starts in the mountains," John put in. "Where?"

"Why, at Mount Aux Source itself. The highest of the Drakensbergs—well over 10,000 feet. The main source of the Orange is there, where Basutoland meets Orange Free State and Natal. Then the river tumbles down to what is called the African Plateau.

"Think of the land it goes through along its 1,300-mile journey. Grassy plains where we are now, then after the Vaal joins it there are miles of the dry High Veld. The river has chewed its way down through deep, steep-walled gorges in this arid region. And our South African sun beats on it and seems almost to suck the water out of it.

"Then a rain comes—one of our typical thunderstorms—and the little dry desert washes that carve sandy paths to the Orange suddenly become frothing torrents, pouring their runoff into the mother river and swelling it so that by the time it reaches Aughrabies Falls it thunders like a giant. At Aughrabies, the Orange drops 400 feet in 16 miles past ledges and reefs and tiny islands twisted into weird shapes by the rushing water."

Piet stopped to relight his pipe. "Aughrabies is where our old Orange looks most like a big, important river," he continued. "Between there and the sea it cuts through rocky canyons in the bleak gravel desert of the west coast. When it finally reaches the Atlantic, so much water has evaporated that the river is a trickle, almost closed by sand bars. That's why no seagoing ships can enter it."

The old man was silent and the boys watched the river roll past.

"It doesn't *look* orange," Edward said. "It looks sort of brown."

Piet laughed. "It was named after the Prince of Orange. That was in 1777 when my

W. ROBERT MOORE, NATIONAL GEOGRAPHIC STAFF

JUNIOR GIANT, JOHANNESBURG
Where Modern Buildings Now Stand in Africa's Third City, There Was Only Treeless Veld 70 Years Ago

The Orange: South Africa's Major River

LUDWIG MAU, © KOESTER

CANYON COUNTRY, SOUTH AFRICAN STYLE—The Orange River Cuts Deep Gorges as It Snakes Through Desolate Deserts along South Africa's Northwestern Boundary

The old South African, Piet Kraamer, shifted his pipe in his mouth and squatted comfortably on his heels. "Sometimes it doesn't look like a great stream," he said, gesturing toward the smooth-flowing Orange River chuckling past below the bank, "but think how much of my country it sees. Think of the history it has watched—and may witness again."

John and Edward, sons of an American mining engineer visiting South Africa, sprawled on the grassy slope above the murmuring water, ready for the story they knew would follow. "Go on, Piet," they urged.

Conversing in English came nearly as easy to Piet as his native Afrikaans. "You see this riverbank," he began. "Well, it was on another bank near here, right in the center of South Africa, that the children of Daniel Jacobs were playing a game with pebbles that day in 1867."

The boys watched Piet's lined face with its little pointed beard. He smiled at their wide eyes and continued. "They were youngsters like you, making up their own games. They didn't know until later that one of their pebbles was a diamond—nearly 22 carats."

"Do you think we could pick one up now, Piet?"

He shrugged. "Diamonds are where you find them. Most have been dug from volcanic pipes around Kimberley, between this river and its little brother, the Vaal. The pipes are like big tubes of lava sunk in the ground and filled with blue clay. In the clay there are diamonds. And

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JUSTIN LOCKE

Cars Oust Patrons from Champs Elysées Cafes

This is Paris . . . sun-splashed sidewalk tables and relaxed patrons outlined against the classic Panthéon, hall of fame for noted Frenchmen.

In the past, outdoor cafes blossomed each spring, especially along the broad, fashionable Champs Elysées. But burgeoning traffic is disrupting even this gracious aspect of French life. Parking is so desperate a problem in Paris today that cars now sit on Champs Elysées sidewalks—along with cafe customers. By the time spring comes again to Paris, tourists will find far fewer terrace tables as more cars take over.

Henry IV built the Avenue des Champs Elysées in 1667 so that his queen might ride smoothly in her coach. During the French Revolution, hapless Louis XVI and Marie Antoinette, with nearly 3,000 others, lost their heads at the Place de la Concorde at one end of the Elysian Way. Thirteen years later Napoleon ordered construction of the Arc de Triomphe at the other end.

Today, the arrow-straight, mile-and-a-quarter-long avenue offers pleasures for all. Children delight in a playground specializing in Punch-and-Judy shows and donkey rides. Lovers stroll through green parks that stretch nearly half a mile. Luxurious hotels, theaters, automobile showrooms, and famous dressmaking establishments line broad pavements.

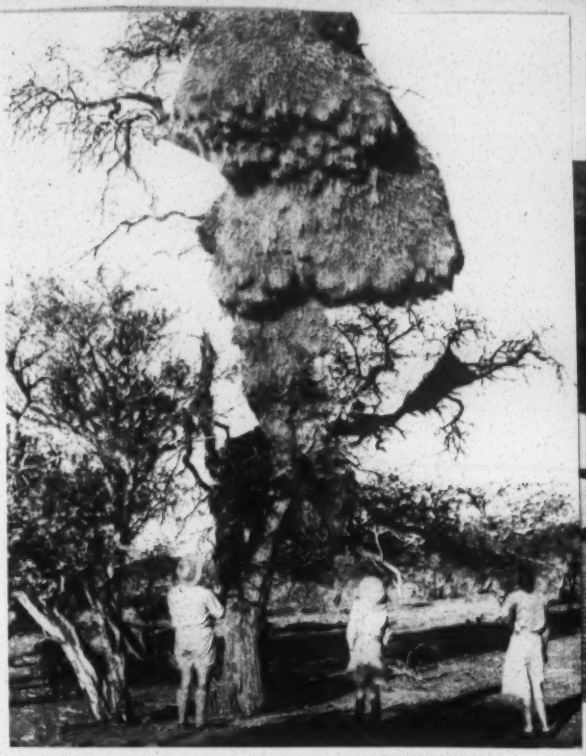
France's Unknown Soldier rests beneath the Arc de Triomphe. His tomb forms a calm island amid the racket of Paris traffic. For a gay picture of Paris see *The National Geographic Magazine* for June, 1952.

UMI

Dutch ancestors were living in Cape Town and your American ones were fighting your Revolution. Explorers knew the river by then. And in 1813 a missionary named John Campbell discovered Aughrabies Falls. Twenty years later the Boers crossed it in their big wagons during the Great Trek. My grandfather, as a boy, went with the Voortrekkers who headed inland from Cape Town because they didn't like British restrictions. They settled what is now Orange Free State—the name comes from the river on its southern boundary. Then they crossed the Vaal into Transvaal."

"Did they have to fight Indians?"

"Not Indians, my lad. Zulus. Fierce, brave Bantu tribesmen who could spit a running springbok with their razor-sharp assegais. The Boers had to fight them for land. But it turned out to be rich land, good for crops and cattle, filled with minerals."



LILIUS FROM THREE LIONS

AFRICAN WEAVER BIRDS BUILT THIS NEST
Hundreds Cooperate to Build These Enormous "Housing Projects" along the Orange River

"Like diamonds."

"Yes, and between the Orange and the Vaal there's coal, copper, iron, and petroleum. There's gold near Johannesburg, north of the Vaal."

"We've been to Johannesburg, but that's a long way from here."

"It's just on the edge of the Orange River Basin. Jo'burg's gold mines are very deep—three go down more than 9,000 feet. So they have to be cooled by water from the Wit River, a branch of the Vaal. That's where we get the name Witwatersrand for the 150-mile-long ridge that holds most of the mines. You see, even South Africa's greatest city, with nearly 900,000 people, is part of the Orange system."

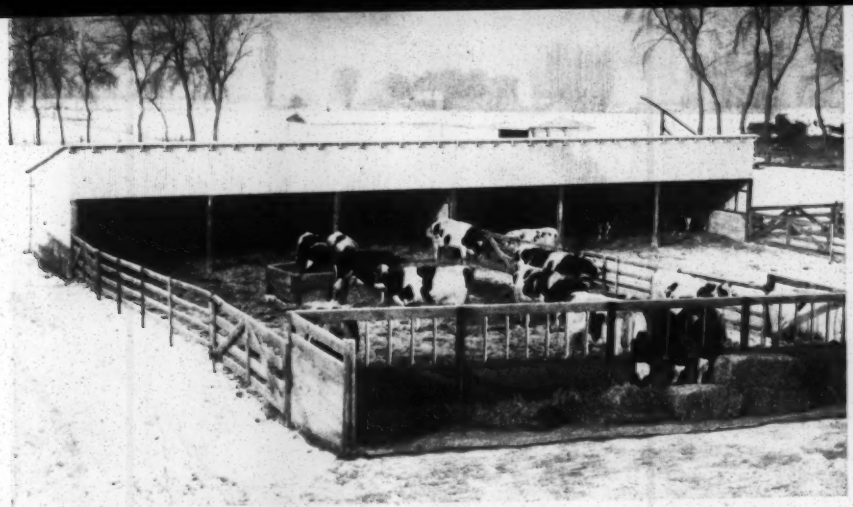
John sat up and pointed at the river. "Where I come from, we'd use water like that for irrigation."

Piet nodded. "We do, too, my boy. There is irrigation above Aughrabies Falls and there is talk now of piping Orange water toward Port Elizabeth to bring a half million fertile acres into production."

The boys rose, ready to go. Edward stooped suddenly, picked up a small stone, and threw it into the gurgling depths of the Orange River.

"Don't," said his brother. "You might throw away a diamond."

National Geographic References: ***Map***—Africa and the Arabian Peninsula (paper 50¢)
Magazine—Aug., 1953, "Safari Through Changing Africa" (75¢)



U. S. D. A.; NATIONAL GEOGRAPHIC PHOTOGRAPHER VOLKMAR WENTZEL; HOWELL WALKER, NATIONAL GEOGRAPHIC STAFF

shelters. The picture above shows one of these new pole barns, built to stay—thanks to creosote, concrete, and aluminum. Inside it, cattle roam freely, shielded from the wind and bathed by sunlight that strikes through the open side—which usually faces south.

The advent of pole barns probably won't affect designs that developed because of special needs. Tobacco barns are built to regulate the drying of leaves. The one at upper right, in Kentucky, has walls that open up like Venetian blinds.

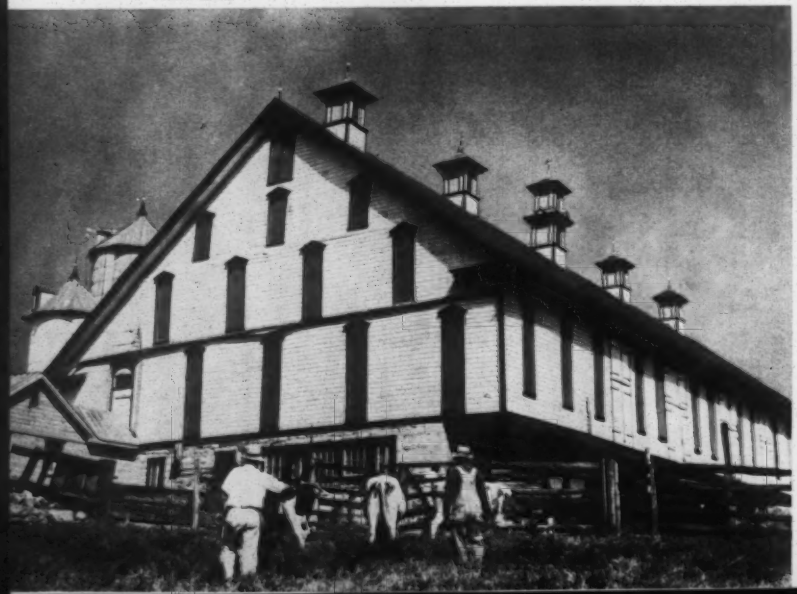
In New England, a farmer can walk from his house to his barn without going outdoors, for farm buildings cluster under one roof, as shown at lower right. This particular farm is way "down east" in Maine's potato-growing Aroostook County, where bitter winters explain the purpose of the joined barn. A man can reach it easier by walking through his shed and dairy than by shoveling his way to it through hip-deep snow.

THE BARN . . . . *America's Red-Painted Horn of Plenty*

There is a favorite American story about a prosperous farmer who spent every scrap of his profits, year after year, on bigger and better barns. He forgot that his own house wasn't much until his wife reminded him by moving out to the newest barn to live.

Of course such a thing seldom, if ever, happened. But you might think so to look at some of the huge, ornate barns that rise like castles on American fields. Take the one below for example. It was built in Maryland in the style of German settlers who took pride in both their work and their cattle. You might call it a "split-level" barn, with a fieldstone "recreation room." Ventilation is one thing a good barn needs. So this one has its full quota of windows.

JUSTIN LOCKE



Pennsylvania Dutch (actually Germans) built the fat red barn below in 1831. At first it was all stone—a massive monument to the toil of its first owner and the bounty of his green acres. The original end walls remain, but a new hip roof spans them.

Farmers in Pennsylvania Dutch country paint symbols on barns, but deny they are to confuse evil spirits that might harm livestock. Artists sometimes add paintings of farm scenes on weathered red walls.

Red has long been the favorite color for American barns, mostly because it has been cheaper than other paints. But modern barns often use other colors, sometimes to harmonize with the farmhouse.

Only the New World boasts such fine farm buildings. Something about the untold promise of vast new lands made European settlers want to lavish their best structural skill on wide-doored, high-peaked, and splendidly-roofed barns.

Before pioneer farmers had completed permanent barns, they got along with lean-to sheds raised on poles. Today's trend is back to similar three-sided

HOWELL WALKER, NATIONAL GEOGRAPHIC STAFF

Swedes brought out a safety match in the mid-1800's, plastering some fire-making chemicals on the match, some on a box's striking surface.

Then came America's contribution. Joshua Pusey, a Philadelphia lawyer, sat at his desk in 1892 cutting and folding a small piece of cardboard. He dipped the ends of 50 thin strips into an icinglike mixture brewed over a pot-bellied stove. Quickly he painted a striking compound inside the cover, folded it, and stapled the strips inside. Result: the modern book match.

A match company bought Pusey's patent, making the matches safer by putting the striking surface outside the folder. But sales dragged until an opera company bought hundreds of match books and started a new kind of advertising. Singers and musicians got writer's cramp handlettering "Wait—We Are Coming" on each tiny book, along with the dates of the performance.

Industrious match salesman Henry C. Traute snapped up the idea. On a hunch, he ordered some blank match books printed with his now-familiar safety slogan, "Close cover before striking," plus an ad for a big Milwaukee brewer. When the Milwaukee man saw the ad he hadn't ordered, he signed up for 10,000,000 match books.

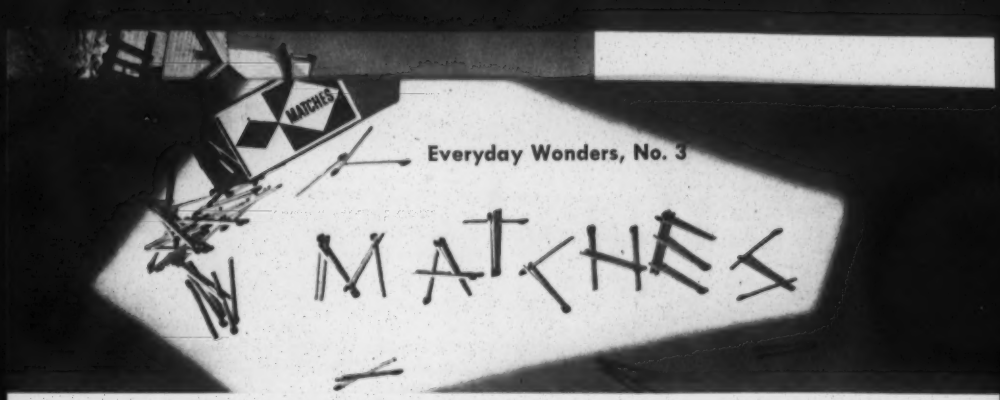
Today some 300,000 advertisers, ranging from restaurants to railroads, spend over $100,000,000 a year for match books, then give them away. As a result, Americans get, free of charge, almost half the matches produced in the United States.

Multicolored match-book covers do thousands of advertising jobs. A Korean war veteran found an apartment through a match-book appeal. A New York hostess prepared an entire dinner from match-book recipes.

BLOCKS TO MATCHES IN MINUTES—Operators Feed Well-Seasoned Pine into Machines. In an Hour They Turn out 1,125,000 Matches, Gliding by on Endless Chains

NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON

UMI



Everyday Wonders, No. 3

MATCHES

Before you finish reading this page, Americans will strike 950,000 matches.

Some will be the old-fashioned "strike anywhere" kind, about a fifth will be the safety type, almost half will be popular book matches—all a part of the more than half a trillion matches made and used in America every year. And that astronomic total makes up only a tenth of the world's production.

Matches haven't always been so plentiful. Little more than a century ago fire builders still used flint and steel to shoot sparks into tinder, then fanned and nursed them into flames.

It took centuries for man to develop portable "firesticks," the first name given to matches. In 1669 an old Hamburg alchemist, Hennig Brandt, bent hopefully over a mixture that he hoped would turn to gold. When it didn't, he threw it out in disgust, not realizing he had stumbled onto phosphorus, keystone of today's match industry. About a decade later two Englishmen made a firestick by pulling sulphur-tipped splints through phosphorus-coated paper. But phosphorus cost $250 an ounce. Few could afford it, so experiments stopped for more than a century.

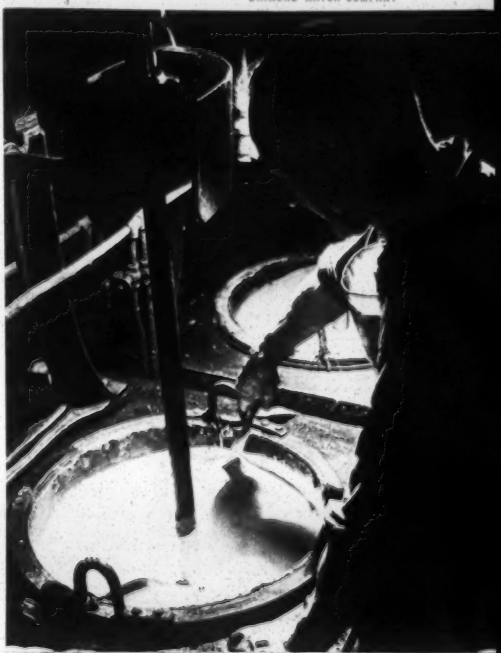
Then the French invented an "ethereal match" in 1781—a phosphorus-tipped strip or string of wax paper sealed in a glass tube. It burst into flame when the glass was broken and oxygen rushed in.

It was in 1827 that British pharmacist John Walker made the first practical friction matches. Sparks sprayed as the three-inch, sulphur-tipped splints scratched through folded sandpaper. To another matchmaker the shower of sparks and strong sickening odor must have seemed like miniature fire and brimstone. For he called his matches "Lucifers," a name that stuck for years.

Soon French Dr. Charles Sauria put phosphorus to work in match heads. The industry boomed. Two

MATCH-HEAD MIXTURE—Manufacturers Add Color to This Cakelike Batter of Chemicals to Form a Tinted Trademark

DIAMOND MATCH COMPANY



Atlantic Airlines Meet at Azores

The constant thunder of four great engines lessens and changes tone for the first time in many hours. Surprised, passengers peer from the windows of their Stratocruiser. Instead of the unbroken gray-blue carpet of ocean, they see hulking mountains lifting green shoulders on scattered islands beneath them.

The plane's wheels lock into place as passengers obey the flashed direction to "fasten seat belts." Flaps curl from wings and the song of engines becomes a surly mutter. Below, heavily cultivated fields, small whitewashed houses, seem to rise toward the plane. The runway's smooth surface unfolds under it. Tires scuff and rumble. In a moment the door opens and a warm ocean breeze sweeps the cabin as travelers alight.

They are at Santa Maria, one of the nine islands of the Azores. Aircraft snarl overhead, taking off for Brazil, for Africa; arriving from New York, London, Lisbon. Huge American military air transports growl distantly on the way to their base on Terceira Island.

Planes grumble night and day above cloud-shrouded Azores mountains. But life for fewer than 300,000 Azoreanos remains tied to the soil—as when Christopher Columbus made port in the Portuguese-owned islands after one of his voyages. People work in tiny fields fenced with walls of lava rock (most of the islands are of volcanic origin). Oxcarts creak along dusty lanes or cobbled town streets, their wooden wheels singing plaintively. Off Fayal and Flores men row out to sea in small boats to harpoon whales, for sperm oil adds to island income.

GREEN PATCHWORK QUILT WRAPS AZORES—Cloud Shadows Darken Some of the Tiny Fields That March up Terceira's Mountains. Summer Weather Is Constant, Warm

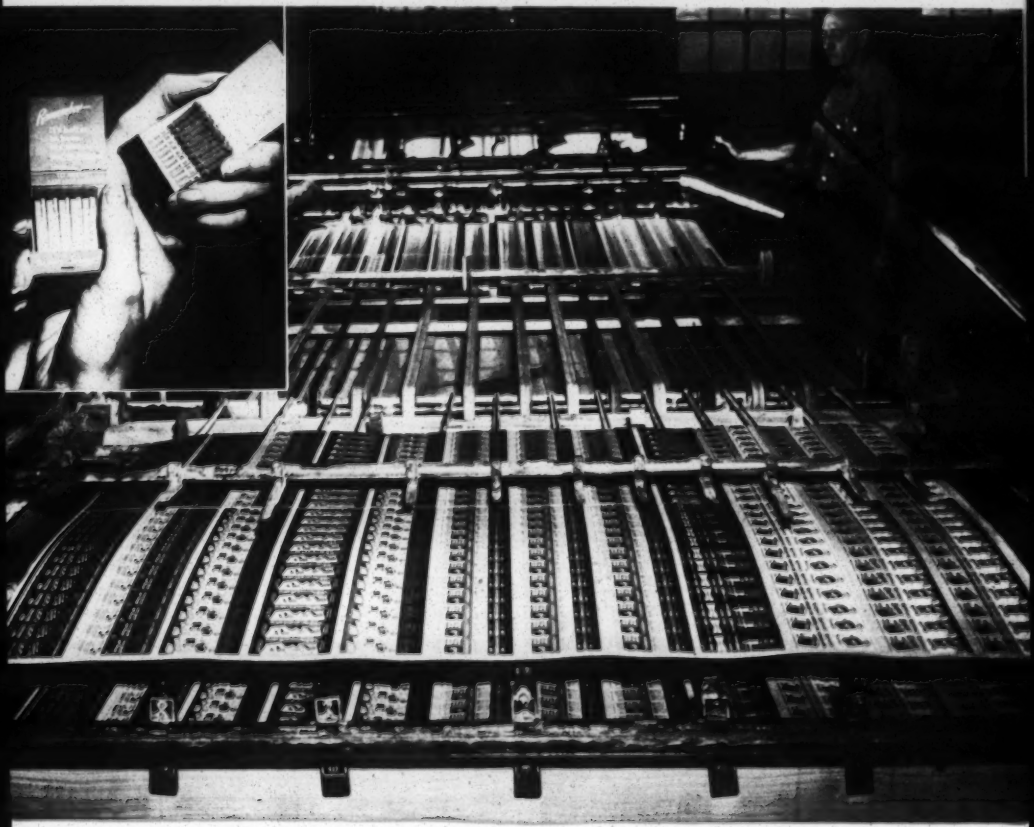
UMI

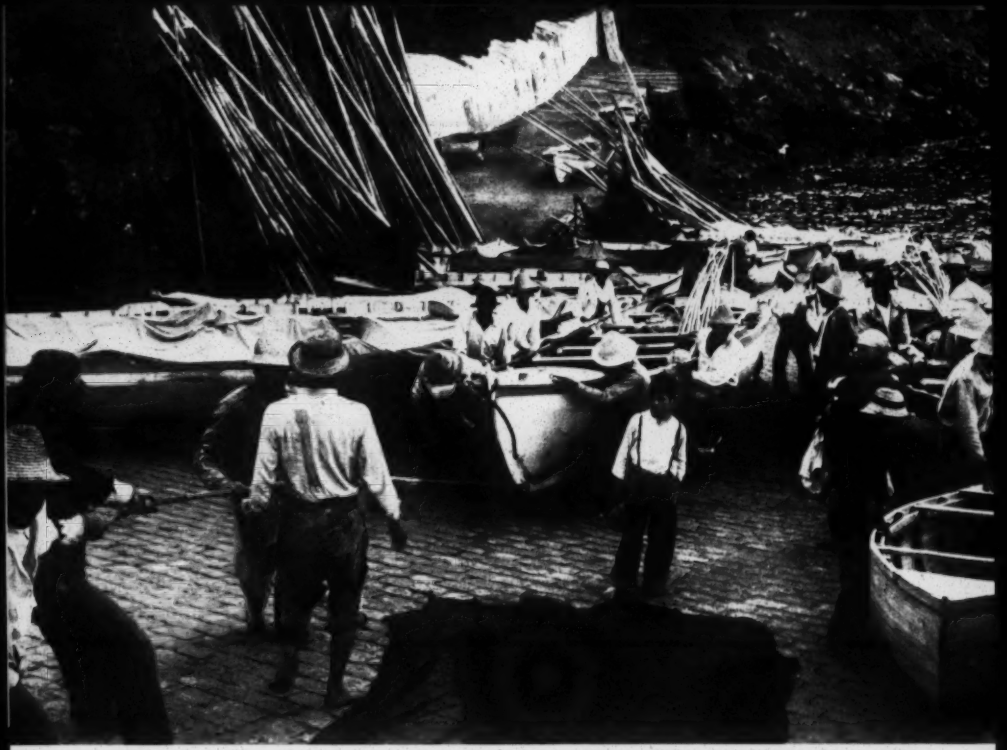
More than a million Americans save, buy, and trade match-book covers; they're outnumbered only by stamp collectors. A cover issued for a Lindbergh dinner after his transatlantic flight is valued at $100. The only known copy of that first cover hand-lettered by the opera company is insured for $25,000. Collectors scrambled for matches issued for President Eisenhower's inaugural, valued a week later at $12 a book.

In United States factories, giant machines spew out 60,000 match books an hour. Steel knives slice rolls of cardboard into comblike patterns 60 matches wide. Grippers hold combs as they move on an endless chain through dipping baths and dryers. Finally, combs are cut into splints 10 matches wide and two matches deep, stapled inside a printed cover, and packed for shipment.

The book match's older big brother, the strike-anywhere type, comes from a machine two stories high that can turn a pine block into boxed matches in an hour. Matchsticks are shaved from blocks, then passed through mixtures of some 30 different chemicals. A machine boxes them so half the heads will fall on one side, half on the other. Their last stop is usually high on the kitchen shelf—out of reach of small children.

MATCHMAKERS ARE PRINTERS, TOO—Blankets of Bright Covers Stream from Huge Presses, Add to Annual United States Output of 12,500,000,000 Match Books





NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON

HOME FROM THE SEA—As Their Ancestors Have Done for Generations, These São Miguel Fishermen Haul Their Open Boats Ashore. Meanwhile Aircraft Roar Overhead

Remote as they are, Azoreanos grow or manufacture some products for world markets. On São Miguel, largest island, glass-roofed hothouses gleam in the sun. They shelter pineapples to be sold in markets of Lisbon, London, Stockholm, and Zurich. Tea plants, set in tidy patterns on mountain meadows, furnish tea for Portuguese tables.

Canneries process the island catch of tuna and sardines for shipment to world markets from Ponta Delgada, the only sheltered harbor. In cottages, often like those of southern Ireland from whence came many early settlers, island women sew fine embroideries which are snapped up by European and American buyers.

Now that air traffic has turned Azores skyways into an Atlantic crossroads, the islands are benefiting from their position as service station for planes from four continents.

"Tanks all filled, sir." The fuel trucks roll away from the poised Stratocruiser. At the nod of a hostess, passengers reenter the plane and fasten seat belts. The cabin door bangs shut, engines explode into life.

Once more the familiar thunder of full power rings out. Santa Maria spins past the windows then drops away to become one of a cluster of nine emeralds spangling the empty Atlantic.

National Geographic References: ***Map***—Atlantic Ocean (paper 50¢; fabric $1)
Magazine—Nov., 1949, "New Discoveries on the Mid-Atlantic Ridge" (75¢)
Separate Color Sheets.—10 pictures of Azores (send for price list)
School Bulletins—Nov. 12, 1951, "Azores Are Aerial Gateway to Europe, Africa" (10¢)